Biogeosciences Discuss., 7, C2577–C2579, 2010
www.biogeosciences-discuss.net/7/C2577/2010/

Biogeosciences Discussions

Interactive comment on "

Carbon fluxes in natural plankton communities under elevated CO_2 levels: a stable isotope labeling study" *by* A. de Kluijver et al.

Anonymous Referee #2

Received and published: 29 August 2010

This manuscript reports an experiment using isotope labeling to track carbon uptake rates by phytoplankton, transfer to bacteria and depositional loss. In the Introduction, I found the general hypotheses very convincing: that elevated CO2 will affect one or more of the growth dynamics of phytoplankton, transfer rates to bacteria or loss rates to deeper water.

The experiment made good use of a major mesocosm set up. The use of 13C as an isotope tracer worked very well, and with back calculations from 13C to total C, several interesting results were obtained.

The paper is clearly written in general, and the figures and tables clear. I have three main issues that need addressing.

1. Given the accidental resuspension of settled material during a storm, I feel the authors have overstated their confidence in the lack of increase in depositional loss rates under increased CO2. This is an important finding, but has the least confidence of any of their conclusions. Although this is clearly covered in the Discussion, the line in the Abstract "There was no indication of enhanced settling based on isotope mixing models during the phytoplankton bloom" seems to overstate it. The following sentence (final sentence of Abstract), on the other hand, nicely captures the main finding.

2. Why were the treatment levels 2x and 3x current CO2 levels used? I could find no justification? It is crucial that these treatment levels be put in the context of realistic predictions for CO2 levels; the work otherwise risks being seen as irrelevant.

3. Presumably the 2 different increased treatments (2x and 3x CO2 levels) were used for a reason. It is thus important to know not only whether the effects of these increases differed from the current level CO2 (control), but also whether they differed from each other. That is, are the conclusions the same for both increased treatments? Is there a threshold in the effect of increased CO2? To my eye (from Tables and Figures), the effects on phytoplankton growth look linear (i.e. magnitude of different between 1x and 2x and same as between 2x and 3x). But, because the wrong statistical model was used for the posthoc text (after ANOVA), this important point could not be established. The authors should re-analyse so that the comparison between 2x and 3x treatments is also tested. And then report that difference more clearly (no change to Figures, but will add a column to Table).

Minor comments

P 3259, l 19. Change to "fixation does not always result"

P 3263, l 23. A symbol is missing from the text immediately after the equation (presume

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it is 13C(control)).

P 3264, l 17-21. Explain why these 2 species of zooplankton (only) were selected?

P 3273, l 11. Delete “Based on the available data” at beginning of sentence.

P 3288. Table 1. For p values, standardise to 3 decimal places. Also, in caption, insert “in” before “the post-bloom phase”.

Interactive comment on Biogeosciences Discuss., 7, 3257, 2010.